along the bank of the Thames at Woolwich. The fuse was exploded during a heavy thunderstorm. The knowledge of the causes of a danger is a sure means for the production of its removal, or of its reduction to a minimum. Low-tension fuses and metallic circuits reduce the evils of lightning, but have not removed them. Should war unhappily break out again in Europe, submarine mining will play a very serious part; and, paradoxical as it may appear—as has been suggested by the French Ambassador, M. Waddington—its very destructiveness may ultimately prove it to be a powerful element of peace.

It seems incredible that, having utilized this great power of Nature to such a wide and general extent, we should be still in a state of mental fog as to the answer to be given to the simple question—What is Electricity? The engineer and the physicist are completely at variance on this point. The engineer regards electricity, like heat, light, and sound, as a definite form of energy, something that he can generate and destroy, something that he can play with and utilize, something that he can measure and apply. The physicist—at least some physicists, for it is difficult to find any two physicists that completely agree with each other—regard electricity as a peculiar form of matter permeating all space as well as all substances, together with the luminiferous ether, which it permeates like a jelly or a sponge. Conductors, according to this theory, are holes or pipes in this jelly, and electrical generators are pumps that transfer this hypothetical matter from one place to another. Other physicists, following Edlund, regard the ether and electricity as identical; and some, the disciples of Helmholtz, consider it as an integral constituent of Nature, each molecule of matter having its own definite charge, which determines its attraction and its repulsion. All attempts to revive the Franklinian, or material, theory of electricity, have, however, to be so loaded with assumptions, and so weighted with contradictions, that they completely fail to remove electricity from the region of the mysterious. It is already extremely difficult to conceive the existence of the ether itself as an infinitely thin, highly elastic medium, filling all space, employed only as the vehicle of those undulatory motions that give us light and radiant heat. The material theory of electricity requires us to add to this another incomprehensible medium embedded or entangled in this ether, which is not only a medium for motion, but which is itself moved. The practical man, with his eye and his mind trained by the stern realities of daily experience, on a scale vast compared with that of the little world of the laboratory, revolts from such wild hypotheses, such unnecessary and inconceivable conceptions, such a travesty of the beautiful simplicity of Nature.

He has a clear conception of electricity as something which has a distinct objective existence, which he can manufacture and sell, and something which the unphilosophic and ordinary member of society can buy and use. The physicist asserts dogmatically: "Electricity may possibly be a form of matter—it is not a form of energy." The engineer says distinctly: "Electricity is a form of energy—it is not a form of matter; it obeys the two great developments of the present generation—the mechanical theory of heat and the doctrine of the conservation of energy." There must be some cause for this strange difference of views. It is clear that the physicist and the engineer do not apply the term electricity to the same thing. The engineer's electricity is a real form of energy; the speculative philosopher's electricity is a vague subjective unreality which is only a mere factor of energy and is not energy itself. This factor, like force, gravity, life, must, at any rate for the present, remain unknowable. It is not known what force is; neither do we know what is matter or gravity. The metaphysician is even doubtful as regards time and space. Our knowledge of these things commences with a definition. The human mind is so unimpressionable, or language is so poor, that writers often cannot agree even on a definition. The definition of energy is capacity for doing work. We practical men are quite content to start from this fiducial line, and to affirm that our electricity is a something which has a capacity for doing work; it is a peculiar form of energy. The physicist may speculate as much as he pleases on the other side of this line. He may take the factors of energy, and mentally play with them to his heart's content; but he must not rob the engineer of his term *electricity*. It is a pity that we cannot settle our difference by changing the term. Physicists might leave the term *electricity* to the form of energy, which is an objective reality, and which the ordinary mortal understands; while engineers would be quite content if speculative physicists and enthusiastic mathematicians would call their subjective unreality, their imaginary electrical matter, by some other term. If it be necessary to mentally create some imaginary matter to fulfil the assumptions and abstractions of their mathematical realizations, let them call it *coulombism* or *electron*, and not appropriate the engineer's generic and comprehensive term electricity. The engineer finds the motions of existing matter and of the ether quite sufficient to meet all his requirements, and to account for all those phenomena which are called electrical.

It seems paradoxical to assert that two unrealities can form a reality, or that two subjective ideas can become an objective one; but it must be remembered that in all electrical phenomena that which makes them real and objective is derived from without. The motion that renders an electrical phenomenon evident is imparted to it from some other form of energy. The doctrine of the conservation of energy asserts that energy is never destroyed, it is only transformed—work must be done to render it evident. No single electrical effect can be adduced which is not the result of work done, and is not the equivalent of energy absorbed. The engineer's notion of work—something done against resistance; and of power—the rate at which this change of condition is effected—are the key-stones to the conception of the character of those great sources of power in Nature whose direction to the uses and convenience of man is the immediate profession of those who generally assemble together in Section G of the British Association to discuss the "practical application of the most important principles of natural philosophy, which has, in a considerable degree, realized the anticipations of Bacon and changed the aspect and state of affairs in the whole world."

I cannot pretend to have given a survey of all the practical applications of electricity. I have but briefly indicated the present area covered by the new and rapidly-growing industry. Five million people upon the globe are now dependent on the electric current for their daily bread. Scarcely a week passes without some fresh practical application of its principles, and we seem to be only on the shore of that sea of economy and beneficence which expands with every new discovery of the properties of electricity, and spreads already beyond the mental grasp of any one single worker.

NOTES.

THE Geological Congress held its first meeting on Tuesday. This week we print the President's address and one of the papers referring to one of the most important points to be considered by the Congress—that of the Crystalline Schists.

INTELLIGENCE has been received of the murder of Major Barttelot, Mr. Stanley's principal lieutenant, by some of his followers when on the way from Stanley Falls with reinforcements for his chief.

THE sudden death of Mr. R. A. Proctor was announced from New York about a week ago. In addition to his writings on various subjects for which his name is so widely known, he made some contributions to the science of astronomy. Some of his books, such as "Saturn and its System," his various star atlases, and others we might name, have a permanent value. Elected a Fellow of the Royal Astronomical Society in 1866, he was for a considerable number of years the most prolific contributor to the *Monthly Notices*. In 1871 he was elected to the Council, and in the following year was appointed the Secretary. The determination of the rotation-period of Mars, a chart of Mars from the collation of a large number of drawings, a long series of papers on transits of Venus, especially the transits of 1874 and 1882, and a yet more important series on the distribution of stars and nebulæ, were communicated to the Astronomical Society during these years. It was in connection with this last series that his greatest single work for science was carried out, viz. the copying of the 324,198 stars of Argelander's "Survey of the Northern Heavens," on an "equal surface" projection chart, a work that involved 400 hours of the most unremitting labour. Mr. Proctor was born at Chelsea, in March 1834, and was educated at King's College, London, of which he was Honorary Fellow, and at St. John's College, Cambridge, where he won a Scholarship. He obtained his degree of B.A. in 1860, and his name appears as twenty-third in the Wrangler's List.

AN evening class in organic chemistry, adapted to the requirements of candidates for the second B.Sc. examination of London University, will be held at the Birkbeck Institution in Chancery Lane during the ensuing session, under the direction of Mr. Frank Gossling, B.Sc. This is said to be the first session in which an evening class of this character has been attempted.

THE *Times* publishes the following interesting letter from Sir William Thomson:—"In the *Times* of to-day (Sept. 14) I see a slight mistake regarding myself. A British Association correspondent says:—'Sir William Thomson in one paper cautiously made what must be regarded as a somewhat noteworthy admission with reference to Clerk-Maxwell's fundamental theory of electromagnetic induction for incomplete circuits. He considered Maxwell's fundamental assumption "not wholly tenable." In all his previous utterances on the subject Sir William has described Maxwell's views on this point as completely untenable.' The paper referred to by your correspondent is my very first public utterance on the subject. An uncorrected proof of it in print contained the words 'wholly untenable,' which I altered to 'not wholly tenable' in reading it to the Section. The fact is, I had always believed in the possibility and probability of Maxwell's assumption (he only gave it himself as probable or possible) until a few months ago, when I saw what seemed to me reasons for wholly discarding it; but two days of the British Association before my paper was read gave me the inestimable benefit of conversation with others occupied with the same subject, and of hearing Prof. Fitzgerald's presidential address in Section A, by which I was helped to happily modify my opinion. In your leading article of to-day I do not think you quite do justice to the British Association and its objects. Your remarks would be wholly just, and, if I may be allowed to say so, very useful criticism, if the British Association were an institution for teaching ascertained scientific results to its members, or 'an annual setting forth of scientific wares.' Its object is the advancement of science. It contributes to this object in a manner altogether peculiar to itself, by bringing together from all parts of the world persons engaged in scientific investigation, and giving them facilities for helping one another in their work, and being helped in it by what they see and hear. No one not following the course of scientific progress, generally or in some particular department, can fully understand how much of practical impulse is owing to the British Association for the contributions made in the course of the year to the scientific societies and magazines, in which achieved results of scientific investigation are recorded and published."

IN the last issue of the Transactions of the Seismological Society of Japan, Prof. Milne discusses the effects of earthquakes on animals. The records of most great earthquakes refer to the consternation of dogs, horses, cattle, and other domestic animals. Fish also are frequently affected. In the London earthquake of 1749, roach and other fish in a canal showed evident signs of confusion and fright; and sometimes after an earthquake fish rise to the surface dead and dying. During the Tokio earthquake of 1880, cats inside a house ran about trying to escape, foxes barked, and horses tried to kick down the boards confining them to their stables. There can, therefore, be no doubt that animals know something unusual and terrifying is taking place. More interesting than these are the observations showing that animals are agitated just before an earthquake. Ponies have been known to prance about their stalls, pheasants to scream, and frogs to cease croaking suddenly a little time before a shock, as if aware of its coming. The Japanese say that moles show their agitation by burrowing. Geese, pigs, and dogs appear more sensitive in this respect than other animals. After the great Calabrian earthquake it is said that the neighing of a horse, the braying of an ass, or the cackle of a goose was sufficient to cause the inhabitants to fly from their houses in expectation of a shock. Many birds are said to show their uneasiness before an earthquake by hiding their heads under their wings and behaving in an unusual manner. At the time of the Calabrian shock little fish like sand-eels (*Cirricelli*), which are usually buried in the sand, came to the top and were caught in multitudes. In South America certain quadrupeds, such as dogs, cats, and jerboas, are believed by the people to give warning of coming danger by their restlessness; sometimes immense flocks of sea-birds fly inland before an earthquake, as if alarmed by the commencement of some sub-oceanic disturbance. Before the shock of 1835 in Chili all the dogs are said to have escaped from the city of Talcahuano. The explanation offered by Prof. Milne of this apparent prescience is that some animals are sensitive to the small tremors which precede nearly all earthquakes. He has himself felt them some seconds before the actual earthquake came. The alarm of intelligent animals would then be the result of their own experience, which has taught them that small tremors are premonitory of movements more alarming. Signs of alarm days before an earthquake are probably accidental; but sometimes in volcanic districts gases have emanated from the ground prior to earthquakes, and have poisoned animals. In one case large numbers of fish were killed in this way in the Tiber, and at Follonica, on the morning of April 6, 1874, "the streets and roads were covered with dead rats and mice. In fact, it seemed as if it had rained rats. The only explanation of the phenomenon was that these animals had been destroyed by emanations of carbon dioxide."

THE Animals' Institute, which was opened this season for the reception of patients, has already more than verified its founders' fears that much suffering amongst the animals belonging to the poorer classes existed without proper surgical treatment. The gratuitous advice daily given is taken full advantage of, and the hospital accommodation for the worst cases is now too small to admit the great number of horses, dogs, cats, and other animals requiring treatment. A supplementary institution is wanted—a sanatorium in the suburbs—where cases requiring prolonged treatment can be kept. Such an addition, if the preliminary expenses were forthcoming, can, it is stated, be made quite self-supporting. The scheme is to be placed on a practical basis at a meeting to be held in the Committee-room of the Animals Institute, 9 Kinnerton Street, Belgrave Square.

A COMMITTEE of the American Association presented a report at the last meeting on the teaching of physics in schools, which was very fully discussed by both the Mathematical and Physical Sections. The following is a summary of the recommendations:—(1) It is the opinion of the Committee that instruction in physics may begin, with profit, in what is generally known as the "grammar school." At the same time it is decidedly opposed to any general recommendation that it must begin there or in the primary school. Here, perhaps more than anywhere else, nearly everything depends upon the teacher. One who has a strong liking for and a good knowledge of physics will be tolerably certain to succeed, while another not thus equipped for the work is equally certain to fail. (2) When taught in the grammar school and by a competent teacher, it should be done mainly by and through illustrative experiments. These may be of the simplest character, involving and exhibiting some of the fundamental principles of science; and they should generally be made by the teacher, the pupils being encouraged to repeat, to vary, and to extend. (3) In any discussion of the character of instruction in physics in the high school, one fact of the utmost importance must not be lost sight of. It is that a large majority of the young people who are educated in the public schools receive their final scholastic training in the high school. Its course of study must be in harmony with this fact, such provision as may be made for those who continue their studies in college or university being merely incidental. It is important that the student should be made acquainted, if only to a limited extent, with the methods of physical investigation, and that he should be able himself to plan and carry out an attack upon some of the simpler problems of the science. It is believed that these two very desirable ends can be reached without giving an undue share of the time and energy of the pupil to the subject. Assuming the high-school course to consist of four years of three terms each, it is recommended that the study of physics should begin not earlier than the third year; that it should continue through one year, three hours a week being devoted to it, not including the time necessary for the preparation of the lesson; and that during the first two terms the work should be text-book work, accompanied by illustrative experiments performed by the instructor, and made as complete as his facilities will allow, while the last term should be devoted to simple laboratory exercises. (4) As to the requirements in physics for admission to college, it is sufficient to say that the course indicated above should be required for admission to any and all courses in the college. (5) In reference to the minimum course in physics for undergraduate students in the college, it seems important to avoid the mistake of asking too much. In many institutions, and especially where the elective system largely prevails, it is possible at present for students to receive a degree and yet be almost absolutely ignorant of the principles of physics. It is the judgment of the Committee that a knowledge of this subject constitutes one of the necessary and essential elements of a liberal education, and a minimum course of three hours per week for one year is recommended. What is usually known as the junior year is most desirable for this work, as at that time the student is sufficiently mature and has acquired the necessary training in mathematics to enable him to make the best of what he does. It is recommended that this course consist entirely of text-book and recitation work, with lectures fully and completely illustrated on the professor's table. The report is signed by T. C. Mendenhall, William A. Anthony, H. S. Corbait, and F. H. Smith.

A CORRESPONDENT of the *Times* calls attention to the new light now shown from the St. Catherine's Point Lighthouse in the Isle of Wight. Prior to May 1 of this year the light exhibited at this station was described in the Admiralty list of lights as fixed, dioptric, of the first order. That is, it was a steady light produced by means of a six-wick concentric oil-burner and refracting lenses, the intensity of the naked flame being equal to about 730 candles. At the present moment an electric light is being shown at St. Catherine's, the full-power intensity of which was recently stated by Captain Sydney Webb, the Deputy Master of the Trinity House, to be equal in illuminating power to rather more than 7,000,000 candles. Every half-minute, in fact—for the light now revolves—a mighty flash of five seconds' duration sweeps around the sea, and is visible at distances that seem incredible. To effect this improvement a commodious engine-room has been added to the establishment, containing three steam-engines of 12 horse-power each, and two magneto-electric machines of the De Meritens type. Two of the engines are intended to work for lighting purposes, the third being meant to work the fog-signal. As a precaution against break-down, everything is in duplicate at least, with an oil light in reserve at well. The only other lighthouses on the coast of England as which the light is produced by means of electricity are Souter Point, on the coast of Durham, between the mouths of the Tyne and the Wear; the South Foreland, and at the Lizard, on the Cornish coast. But the St. Catherine's light is ten times more powerful than the best of them, the one on Souter Point. It is, in fact, one of if not, as is believed, actually the most intensely brilliant light in existence, and one which the country as a maritime nation may certainly feel proud to see on its shores.

ON the 25th ult. the ascent of Mount Elburz was successfully made from the eastern side by Baron Ungern Sternberg. In notifying the event to the Tiflis Geographical Society, the Baron wrote:—" We set out at 11, and crossed the glaciers Iriktchat, Atrium, and Djelkaoughenkes, hitherto deemed impassable. At an altitude of 15,200 feet, I discovered an enormous crater. We passed three nights on the mountain at the different heights of 9000, 14,760, and 17,840 feet. At the last height we passed through a terrific snowstorm. Breathing was not attended with any great difficulty. The health of my men has been good. I descended by the southern side between Azaou and the Terek.'

THE last number of the *Mittheilungen* of the Vienna Geographical Society has an account by Dr. Svoboda, surgeon of the Austrian man-of-war *Aurora*, of a visit of that ship, in 1886, to the Nicobar Islands. This archipelago is usually divided into three groups:—(1) The northern islands, including Batti Malive and Kar Nicobar, which are thickly populated, some of them being flat and some mountainous and covered with jungle. Kar Nicobar has an extensive trade with Ceylon, Burmah, Singapore, and other places, as many as between forty and fifty vessels touching there annually; in fact, its harbour is never without a number of ships. The sole industry of the inhabitants is the manufacture of a kind of earthenware vessels, which they export to the other islands. Other articles of trade are "birds'-nest soup" and "sea-slug soup." The two other groups of islands are (2) the southern islands, including Great and Little Nicobar, and (3) the central islands, comprising Teressa, Chowra, Katchall, Bompoka, and many others. The inhabitants of these groups of islands are divided into classes by Dr. Svoboda—namely, the Shab-Dwa, the inhabitants of the coast, and the Shom-Pen, the inhabitants of the interior. The first class resemble the inhabitants of Siam and Burmah, but are, in general, lighter in colour than these latter. Both men and women are repulsive in appearance, though they are generally well formed. The men wear very long hair, and are, as a rule, weak and inactive. Visitors to the islands find it almost impossible to see the young unmarried women, so closely are they kept from the eyes of strangers. Prior to the visit of Dr. Svoboda, nothing appears to have been known of the Shom-Pen, or inhabitants of the interior. They are completely isolated from the outer world, and are very simple in their habits. The men wear the ordinary loin-cloth, and the women a short skirt, usually their own manufacture, and the only personal ornaments they have are small pieces of bamboo in their ears, and necklaces of variously coloured glass beads or ribbons many feet in length. Malaria is very prevalent in all the islands, especially in October and November, when the weather is hot and dry. Dr. Svoboda gives a short historical and geographical sketch of the islands, which now have a population of about 6000 souls. The Arabs appear to have been the earliest visitors, and Portuguese vessels used to call there frequently; indeed, many Portuguese words are in common use amongst the natives.

A PAPER was recently read before the French Academy of Sciences by M. Emile Lavasseur on the "Centenarians now living in France." The first reports collected gave the number of persons who had attained 100 years and upwards as 184, but on these being thoroughly sifted no less than 101 were struck out, leaving 83, but even of these there were no fewer than 67 who could not furnish adequate proof of their reputed age. In 16 cases, however, authentic records of birth or baptism were found, including that of a man born in Spain, and baptized August 20, 1770. His life was spent almost wholly in France. All the other centenarians were reputed to be between 100 and 105 years of age, with the exception of a widow claiming to be 112 years old. Of the 83 persons said to be centenarians women formed a large majority, the proportion being 52 women to 31 men. There were but few married couples, 6 male and 16 female celibates, 23 widowers, and 41 widows. One of the latter was Madame Rostkowski, 103 years of age. She enjoys a pension of 60 francs a month, allowed her by the French Government in consideration of her late husband's military services. More centenarians exist in the south-western departments, than in the rest of the Republic, while the basin of the Garonne—from the Pyrenees to the Puy de Dôme—contains as many as all the rest of France put together. M. Lavasseur finds that the chances of a person in the nineteenth century reaching 100 years of age are one in 18,800.

In a recent number of *La Nature* Colonel Hennebert, of the Belgian army, describes underground forts which have come into use in Belgium, as one of the principal methods of national defence. One of these underground forts is like an enlarged mole-hill, and is built of concrete. Measuring 50 metres in length by from 30 to 40 in width, it is about 12 metres below the surface of the ground, and its greatest height above the earth is no more than 3 or 4 metres. It presents the appearance of an elliptical cap placed on the ground, and is scarcely visible to the eye of an observer. At the centre of this artificial rock are three armoured towers, each with two heavy guns. There are also four small forts, which are pulled in and run out at pleasure, each armed with two rapid-firing guns. At three suitable places there are armoured points of observation, from two of which at night the electric light can be flashed to watch the operations of the enemy. Below this surface the earth is hollowed out in the form of a huge well with armoured sides, which is divided up into sections, each part protected with heavy armour, one part for provisions and ammunition, another for machinery, which includes the dynamos and accumulators for the lighting of the whole fort, hydraulic machines for working the movable turrets and sending them ammunition, pumps for supplying these machines with water, and a series of ventilators to keep the air pure. Communication with the outer world is made by a subterranean gallery, the length of which varies according to surrounding circumstances. The ceiling of this gallery is from 8 to 10 metres below the surface. To gain access to the fort an hydraulic piston is worked, and this raises a ladder which runs along the whole length of the fort, and lowers the door of the outlet, which is protected by armour 20 centimetres in thickness, and is under the fire of two of the movable forts. All movements, such as changes of guard, arrivals of supplies, &c., are reported by telephone or telegraph. The guard does not work the hydraulic piston, except at command, and when the sentries in one of the movable forts have reconnoitred the visitors. Finally, the gallery communicating with the outer world is strongly fortified by an armoured door defended by two mitrailleuses. One of the greatest objections by generals to forts, that they absorb numbers of men who are wanted in the field, cannot be urged against these subterranean forts, for the garrison consists of thirty or forty mechanics and specialists only, whose absence would not appreciably weaken the regiment from which they are drawn. The cost of one of these forts is only about £100,000.

A CORRESPONDENT of the *Times* gives an interesting description of the Brünig Railway, which has recently been opened between Lucerne and Bernese Oberland. The gradient is in places very steep, being as much as 1 in 8; and on this account special precautions had to be taken both in the up and the down journeys. Generally speaking, the Rigi system has been adopted. The locomotive turns a cog-wheel which runs on a toothed rack placed between the rails, and so the train slowly travels, or rather is dragged, up hill. The cog-wheel is stopped and the engine works in the ordinary way when a moderate gradient or a level piece is met with. To check the too rapid descent of the train, the engine is fitted with a pneumatic counter-pressure action brake, which of itself is sufficient to stop the train. Besides this, each vehicle in the train is fitted up with a cog-wheel and rack similar to those used in the ascent, with drums on the axle to which clip-brakes are applied. By these appliances the speed can be regulated and the train stopped at any moment. There was another danger, however, incident to all steep railways, to be encountered—namely, the risk to the couplings during an ascent. Though the brakes on each vehicle would probably be sufficient in such a case, yet it was thought fit to take further precautions. When the train is at rest, the brake is kept fully applied by heavy weights. These weights are lifted by steam-power, which is conveyed from the engine in flexible tubes. If a coupling breaks, the flexible tube conveying the steam also breaks, and the weights fall down automatically and check the motion of the carriages. It only remains to say that the gauge is a very narrow one, being only 1 metre.

THE *American Meteorological Journal* for August contains:—(1) An article by C. C. McCaul, on the climatic effects of the Chinook wind in South Alberta, the country of the great cattle ranges in Canada, extending from lat. 49° to the Red Deer River to the northwards, and from the Rocky Mountains, on the west, to about 140 miles east. The Chinook wind blows from west to south-west, in varying degrees of strength; and the thermometer often rises in a few hours from 20° below to 40° above zero, while the snow, which may have been a foot deep in the morning, disappears before night. (2) A sketch of Prof. Abbe's work, with a portrait. He was appointed to the Weather Bureau at Washington in January 1871, and at once urged the desirability of establishing the State weather services which now form so important a part of the policy of the Signal Service. Among the many recommendations of Prof. Abbe we may mention the establishment of a "Scientific and Study Division," which was formed early in 1881, and the compilation of a Meteorological Bibliography which, although still unpublished, has grown to considerable dimensions. (3) Mr. A. L. Rotch continues his description of the meteorological service in Switzerland.

WE have received from Dr. G. Hellmann, of the German Meteorological Office, an account of the torrential rainfall of August 2 to 3 last, which caused disastrous inundations of some of the Silesian tributaries of the Oder. The storm lasted from 15 to 18 hours, during which time nearly 8 inches of rain fell over a large district, and more or less affected Galicia, Bohemia, and Poland. These heavy rains do not seem to have been caused by the same storm which gave us 1¼ inch of rain in London, on August 1 to 2, but by a distinct subsidiary depression which gradually formed over Germany on the 2nd, and moved away towards the Baltic.

MESSRS. SWAN SONNENSCHEIN AND CO. have the following works on natural history and science in the press:—"The Nature of Harmony and Metre," by Moritz Hauptmann, translated and edited by W. E. Heathcote, M.A.; "Atlas of Fossil Conchology," being the original steel plates in Brown's "Fossil Conchology," with descriptive letterpress; "The Naturalist in Siluria," by Captain Mayne Reid, illustrated; "Land and Fresh-Water Shells," by Dr. J. W. Williams; "An Introduction to Zoology," by B. Lindsay; "The Wanderings of Plants and Animals," by Prof. Victor Hehn, edited by J. S. Stallybrass.

THE additions to the Zoological Society's Gardens during the past week include two Central American Agoutis (*Dasyprocta isthmica*), obtained by purchase; a Large Hill Mynah (*Gracula intermedia*) from India, presented by Lieut.-Col. R. Thompson; a White-backed Piping Crow (*Gymnorhina leuconota*) from

Australia, presented by Mr. R. Hall; two White-fronted Amazons (*Chrysotis leucocephala*) from Cuba, a Prince Albert's Curassow (*Crax alberti*) from Columbia, a Mexican Guan (*Penelope purpurascens*), obtained by purchase; a Herring Gull (*Larus argentatus*), British, presented by the Marchioness of Cholmondeley; a Tuberculated Iguana (*Iguana tuberculata*) from Brazil, presented by Mr. H. E. Blandford; a Chameleon (*Chamæleon vulgaris*), three Lacertine Snakes (*Cœlopeltis lacertina*), and two Horseshoe Snakes (*Zamenis hippocrepis*) from Morocco, presented by Mr. Herbert E. White.

OUR ASTRONOMICAL COLUMN.

COMET 1888 *c* (BROOKS).—Dr. H. Kreutz has more recently computed for this comet more exact elements than those which he had obtained from the observations of August 9, 10, and 11. These later elements are based on observations made at Vienna on August 9, at Hamburg, August 14 and 24, and at Strassburg, August 19; aberration and parallax being corrected for.

$$T = 1888 \text{ July } 31{\cdot}25115, \text{ Berlin M.T.}$$

$$\left.\begin{aligned} \omega &= 59^\circ\ 19'\ 2''{\cdot}5 \\ \Omega &= 101\ 32\ 50{\cdot}1 \\ \iota &= 74\ 12\ 13{\cdot}7 \end{aligned}\right\} \text{Mean Eq. } 1888{\cdot}0.$$

$$\log q = 9{\cdot}955456$$

Error of middle places (O – C),

$$\begin{aligned} &\text{August } 14 \ \ldots\ \Delta\lambda \cos\beta = -3''{\cdot}5\,;\ \Delta\beta = -3''{\cdot}2 \\ &\phantom{\text{August }} 19 \qquad\qquad\qquad\quad +3{\cdot}3\,;\qquad\quad -3{\cdot}4 \end{aligned}$$

Prof. A. Krueger (*Astr. Nach.*, No. 2855) has computed the following ephemeris for Berlin midnight from the foregoing:—

1888.	R.A. h. m. s.	Decl. ° ′	Log *r*.	Log Δ.	Brightness.
Sept. 21	14 57 40	21 13·7 N.	0·1084	0·2310	0·45
23	15 5 34	19 44·1			
25	15 13 7	18 16·4	0·1242	0·2456	0·39
27	15 20 22	16 51·0			
29	15 27 19	15 27·9 N.	0·1396	0·2611	0·34

The brightness on August 9 is taken as unity.

On August 11 the comet was observed at the Observatory of Algiers, and the nucleus was estimated as being about equal in brightness to a star of the tenth magnitude; the nebulosity was about 1′ in diameter, and there was a faint tail in the direction of the diurnal movement. Prof. L. Boss, observing the comet at Albany, N.Y., estimated it on August 10 as of mag. 9, and on August 19, in bright moonlight, as mag. 11. The tail on August 10 was estimated as 10′ in length, and was of the same breadth as the head.

DISCOVERY OF A NEW COMET, 1888 *e*.—Mr. E. E. Barnard, formerly of Nashville, Tennessee, now at the Lick Observatory, discovered a new comet on September 3 at 0h. 33m. G.M.T., R.A. 6h. 52m. 16s., Decl. 10° 59′ N. The comet is described as circular, 1′ in diameter, of the eleventh magnitude, with tolerably well-defined nucleus, but with no tail. Dr. Kobold observed it at Strassburg on September 5 at 13h. 44·1m. G.M.T., R.A. 6h. 52m. 1·5s., Decl. 10° 49′ 33″ N.

COMET 1888 *d* (FAYE).—Placing the perihelion passage of this comet as 2·60d. later than given in Dr. Möller's elements, an alteration according well with the observations at Nice, August 9-17, Dr. H. Kreutz has computed (*Astr. Nach.*, No. 2856) the following ephemeris for it for Berlin midnight:—

1888.	R.A. h. m. s.	Decl. ° ′	Log *r*.	Log Δ.	Brightness.
Sept. 21	6 47 41	15 36 N.	0·2472	0·2244	1·33
23	6 51 59	15 16			
25	6 56 12	14 56	0·2489	0·2177	1·36
27	7 0 21	14 35			
29	7 4 24	14 14 N.	0·2509	0·2110	1·39

The brightness on August 9 is taken as unity.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1888 *SEPTEMBER* 23-29.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on September 23

Sun rises, 5h. 50m.; souths, 11h. 52m. 6·7s.; sets, 17h. 54m.: right asc. on meridian, 12h. 3·1m.; decl. 0° 20′ S. Sidereal Time at Sunset, 18h. 6m.

Moon (at Last Quarter September 28, 9h.) rises, 19h. 18m.*; souths, 2h. 0m.; sets, 8h. 54m.: right asc. on meridian, 2h. 9·5m.; decl. 7° 44′ S.

Planet.	Rises. h. m.	Souths. h. m.	Sets. h. m.	Right asc. and declination on meridian. h. m.	° ′
Mercury..	7 56	13 10	18 24	13 21·0	9 53 S.
Venus	7 42	13 7	18 32	13 18·2	7 30 S.
Mars	12 21	16 15	20 9	16 26·9	23 20 S.
Jupiter	11 33	15 48	20 3	15 59·3	19 59 S.
Saturn	1 34	9 6	16 38	9 16·4	16 40 N.
Uranus	7 18	12 51	18 24	13 2·0	5 57 S.
Neptune..	20 5*	3 52	11 39	4 2·0	18 57 N.

* Indicates that the rising is that of the preceding evening.

Occultation of Star by the Moon (visible at Greenwich).

Sept.	Star.	Mag.	Disap. h. m.	Reap. h. m.	Corresponding angles from vertex to right for inverted image. ° °
28	ζ^2 Geminorum	4	22 20	23 11	55 245

Sept.	h.	
23	22	Mercury at greatest distance from the Sun.

Variable Stars.

Star.	R.A. h. m.	Decl. ° ′		h. m.	
U Cephei	0 52·4	81 16 N.	Sept. 26,	4 33	*m*
ζ Geminorum	6 57·5	20 44 N.	,, 24,	0 0	*M*
			,, 29,	4 0	*m*
T Ursæ Majoris	12 31·3	60 6 N.	,, 28,		*m*
R Boötis	14 32·3	27 13 N.	,, 27,		*m*
δ Libræ	14 55·0	8 4 S.	,, 27,	20 24	*m*
U Coronæ	15 13·6	32 3 N.	,, 29,	20 31	*m*
U Ophiuchi	17 10·9	1 20 N.	,, 25,	20 34	*m*
Z Sagittarii	18 14·8	18 55 S.	,, 24,	19 0	*M*
β Lyræ	18 46·0	33 14 N.	,, 24,	2 0	*M*
S Sagittæ	19 50·9	16 20 N.	,, 27,	21 0	*m*
X Cygni	20 39·0	35 11 N.	,, 29,	5 0	*m*
T Vulpeculæ	20 46·7	27 50 N.	,, 28,	19 0	*M*
			,, 29,	20 0	*m*
Y Cygni	20 47·6	34 14 N.	,, 23,	3 18	*m*
			,, 26,	3 12	*m*
δ Cephei	22 25·0	57 51 N.	,, 27,	3 0	*M*

M signifies maximum; *m* minimum.

Meteor-Showers.

	R.A.	Decl.	
Near α Arietis	30°	18° N.	
	105	50 N.	Very swift.
,, δ Draconis	290	70 N.	Swift.

THE INTERNATIONAL GEOLOGICAL CONGRESS.[1]

I DEEPLY regret that, in consequence of his state of health, Prof. Huxley is unable to be present to-day to bid you welcome to England. But if one voice is here wanting, let me assure you that the unanimous voice of English geologists unites in the same sentiment, and also thanks you, gentlemen, our foreign colleagues, for having responded in a manner so flattering to the invitation of English geologists to meet this year in London. For in this assembly there are representative geologists from Germany, Austria, Belgium, Denmark, Spain, France, Holland, Hungary, Italy, Norway, Portugal, Roumania, Russia, Sweden, Swizerland, as well as from the United States, Canada, Mexico, the West Indies, the Argentine Republic, and Australasia. From all these countries eminent and illustrious men honour us with their presence, and are here to aid us by their

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[1] Inaugural Address delivered by Prof. J. Prestwich, President of the Congress, on September 17, 1888. (Translated from the French.)